

We claim:

1. An over-the-needle catheter assembly including:

a tube made of a flexible, bio-compatible material, the tube having a proximal portion, a distal portion and a catheter tip positioned on the distal portion remote from the proximal portion;

a lumen extending through the tube, substantially co-axially with the tube, from the proximal portion, through the distal portion and through to the catheter tip;

wherein the lumen has a proximal cross-section in the proximal portion of the tube and a distal cross-section in the distal portion of the tube, and wherein the proximal cross-section is larger than the distal cross-section;

a shoulder disposed in the tube between the distal portion and the proximal portion;

wherein a catheter land is defined as the portion of the lumen disposed in the distal portion of the tube between the shoulder and the distal end, and wherein the catheter land has a predetermined length;

a needle having a substantially circular cross-section and a needle tip, wherein the needle is disposed in the lumen;

a discontinuity on the needle at a predetermined position with respect to the needle tip, wherein the discontinuity has a distal edge;

wherein the distance between the distal edge of the discontinuity and the needle tip is equal to or more than the length of the catheter land; and

wherein the discontinuity is sized such that it fits within the lumen at the proximal portion but does not fit within the lumen at the distal portion.

2. The over-the-needle catheter assembly of claim 1 wherein the cross section of the needle is larger than the distal cross section of the lumen.

3. The over-the-needle catheter assembly of claim 1 wherein the catheter land has an oval cross section.

4. The over-the-needle catheter assembly of claim 1 wherein the catheter land has ribs or tabs to engage the needle.

5. The over-the-needle catheter assembly of claim 1 wherein the needle includes a notch.

6. The over-the-needle catheter assembly of claim 1 wherein the shoulder is shaped to match the distal edge of the discontinuity.

8. An over-the-needle catheter assembly for insertion into a patient, including:

a tube made of a flexible, biocompatible material, the tube having an inner wall, an outer wall, a proximal portion, a distal portion and a catheter tip positioned on the distal portion remote from the proximal portion;

a lumen defined by the inner wall extending through the tube, substantially co-axially with the tube, from the proximal portion, through the distal portion and through to the catheter tip, forming an opening in the catheter tip;

wherein the lumen has a proximal cross-section and a distal cross-section, and wherein the proximal cross-section is larger than the distal cross-section;

a shoulder disposed in the tube between the distal portion and the proximal portion;

wherein a catheter land is defined as the portion of the inner wall disposed in the distal portion of the tube between the shoulder and the catheter tip, and wherein the catheter land has a predetermined length and a predetermined cross

section; and

a needle having a tip, the needle being slidably disposed within the lumen.

9. The over-the-needle catheter assembly of claim 8 wherein the needle includes a discontinuity and the predetermined length of the catheter land is determined based, at least in part, on the distance between the tip of a needle and a discontinuity on the needle.

10. The over-the-needle catheter of claim 8 wherein the distal portion of the outer wall of the tube is tapered toward the opening in the catheter tip.

5 11. The over-the-needle catheter of claim 8 wherein the tube has an axis and the shoulder is disposed at an angle of about 45 degrees with respect to the axis.

10 12. The over-the-needle catheter of claim 8 wherein the tube has an axis and the shoulder is disposed at an angle of about 90 degrees with respect to the axis.

15 13. The over-the-needle catheter of claim 8 wherein the tube has an axis and the shoulder is disposed at an angle of about 86 degrees with respect to the axis.

14. An intravenous catheter for use with a needle, including:  
a tube made of a flexible, biocompatible material, the tube having an inner wall, an outer wall, a proximal portion, a distal portion and a catheter tip at the distal portion remote from the proximal portion;

a lumen defined by the inner wall extending through the distal portion of the tube and through to the catheter tip, forming an opening in the catheter tip;

wherein the lumen has a proximal cross-section and a distal cross-section, and wherein the proximal cross-section is larger than the distal cross-section;

25 a shoulder disposed in the tube between the distal cross section and the proximal cross section;

wherein a catheter land is defined as the portion of the inner wall disposed in the distal portion of the tube between the shoulder and the catheter tip, and wherein the catheter land has a predetermined length and a predetermined cross section.

15      The catheter of claim 14 for use with a needle including a discontinuity, wherein the predetermined length of the catheter land is determined based, at least in part, on the distance between a tip of a needle and a discontinuity on the needle.

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16.      The over-the-needle catheter assembly of claim 1 wherein the shoulder is shaped to match the distal edge of the discontinuity.

10      17.      The catheter of claim 14 wherein the catheter land has an oval cross section.

18.      The over-the-needle catheter assembly of claim 14 wherein the catheter land has ribs or tabs to engage the needle.

15      19.      The catheter of claim 14 wherein the tube has an axis and the shoulder is disposed at an angle between about 45 degrees to 90 degrees with respect to the axis.

20      20.      The over-the-needle catheter assembly of claim 1 wherein the shoulder includes ridges.